

# PDR RID Report

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Document User and Algorithm Models

RID ID	PDR	447
Review	SDPS	
Originator Ref		YS001
Priority	2	

Section Boundary Conditions

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Figure Table NA

Category Name Data Modeling

Actionee HAIS

Sub Category

Subject Peak processing capability

## Description of Problem or Suggestion:

assumption of peak processing capability is too large at least 4 times average requirement

## Originator's Recommendation

I think it is enough that assumption is 1.3 times average requirement

## GSFC Response by:

GSFC Response Date

HAIS Response by: Eisenstein

HAIS Schedule

HAIS R. E. A. Endal

HAIS Response Date 6/5/95

The requirement that peak processing capability must be at least four times greater than the average processing requirement is in the Functional and Performance Requirements Specification for the Earth Observing System Data and Information System (EOSDIS) Core System (GSFC Document 423-41-02):

PGS-1301 The effective CPU processing rates used for sizing purposes in PGS-1300 shall not be greater than 25% of peak-related CPU capacity.

The RID originator suggests that a ratio of 1.3 is a better assumption. Values in this range are often quoted by vendors, based on benchmarks for supercomputers running applications which are CPU-bound and designed to take full advantage of the processing architecture. The ratio of peak to average processing performance depends, among other things, on:

- o efficiency of CPU utilization by the application,
- o overhead associated with the operating system, and
- o time spent waiting for data to be available for processing.

For all of these factors, the ECS situation differs from the typical supercomputer benchmarks, as explained below. As a result, the vendor-quoted ratios are not applicable to the ECS.

Application efficiency - In development of the science software applications, an emphasis has been placed on code portability, both to facilitate porting from the SCF development environment to the DAAC production environment and to permit porting to new platforms within DAACs. This flexibility is critical for a processing system which will operate for approximately two decades. The price of this portability is that the science software applications will not be specifically designed for the computing platform in use at any given time.

Overhead - The operating system is generally not included in the 1.3 factor quoted by supercomputer vendors. In the present case, this overhead must be included since the "effective CPU processing rates" includes only operations performed by the application. In the ECS case, this overhead must also include operations due to interface software such as the SDP Tool kit.

Data availability - The vendor values are based on benchmarks in which all the input data are immediately accessible on high-speed, processor-attached disk, such that the CPU spends negligible time waiting for data. By contrast, ECS processing is data-driven. This means that processes are scheduled for execution when all of the primary and ancillary data are available. In general, this minimizes the time required to make a product available to users. The associated penalty is that processors will, at times, be idle due to non-availability of the required input data. Here again, this increases the estimated peak to average processing performance.

When all of the above factors are considered, the average to peak processing ratio of four is a more realistic value than the RID originator's suggestion. This does not mean that the estimate for this ratio cannot be improved. Such improvement will occur as a result of ongoing benchmarking and ECS performance modeling efforts.

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Status	Closed	Date Closed	7/6/95	Sponsor	Daly
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\*\*\*\*\* Attachment if any \*\*\*\*\*

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